

REMARKS

At the time of the Office Action dated July 28, 2003, claims 1-17 were pending in this application. Of those claims, claims 1-5 and 17 have been rejected and claims 6-16 have been withdrawn from consideration pursuant to the provisions of 37 C.F.R. § 1.142(b). Claims 1 and 5 have been amended. Claim 1 has been amended to recite that a hard mask covers only the surface of a thick film, consistent with Figs. 1E and 1F of the originally-filed disclosure. Claim 5 has also been placed in independent form by including the limitations of independent claim 1, upon which claim 5 directly depends. Applicants submit that the present Amendment does not generate any new matter issue.

Claims 1-3 and 17 are rejected under 35 U.S.C. § 103 for obviousness based upon Tao et al., U.S. Patent No. 6,399,515 (hereinafter Tao), in view of Sudo, U.S. Patent No. 5,420,462

In the second enumerated paragraph of the Office Action, the Examiner asserted that one having ordinary skill in the art would have been motivated to modify Tao in view of Sudo to arrive at the claimed invention. This rejection is respectfully traversed.

Initially, Applicants note that claim 1 has been amended to recite that a hard mask covers only the surface of a thick film. In the statement of the rejection, the Examiner asserted that feature 38a in Tao corresponds to the claimed hard mask and features 36a and 36b correspond to the claimed thick and thin film wiring. However, upon reviewing Tao, Applicants note that feature 38 (i.e., the asserted hard mask) is formed on both feature 36a and 36b (see Figs. 7 and 8

of Tao). As previously stated, claim 1, as amended, recites that the hard mask covers only the surface of the thick film. Thus, Tao fails to teach or suggest this feature. Furthermore, the Examiner's secondary reference of Sudo also fails to teach or suggest that a hard mask covers only the surface of the thick film.

Therefore, even if one having ordinary skill in the art were motivated to combine the Tao in view of Sudo, the claimed invention would not result, as neither of these references teaches or suggests a structure wherein a hard mask covers only the surface of the thick film. Applicants, therefore, respectfully submit that the imposed rejection of claims 1-3 and 17 under 35 U.S.C. § 103 for obviousness based upon Tao in view of Sudo is not viable and, hence, Applicants solicit withdrawal thereof.

Claim 4 is rejected under 35 U.S.C. § 103 for obviousness predicated upon Tao in view of Sudo and further in view of Williams, U.S. Patent No. 6,087,269

In the third enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the combination of Tao and Sudo in view of Williams to arrive at the claimed invention. This rejection is respectfully traversed.

Claim 4 depends ultimately from independent claim 1, and Applicants incorporate herein the arguments previously advanced in traversing the imposed rejection of claim 1 under 35 U.S.C. § 103 for obviousness based upon Tao in view of Sudo. Specifically, the combination of Tao in view of Sudo does not result in a structure wherein a hard mask covers only the surface of a thick film, as recited in claim 1. The tertiary reference to Williams also does not disclose this concept.

Accordingly, the proposed combination of references would not yield the claimed invention.

Applicants, therefore, respectfully submit that the imposed rejection of claim 4 under 35 U.S.C. § 103 for obviousness based upon Tao in view of Sudo is not viable and, hence, solicit withdrawal thereof.

Claims 1-3, 5 and 17 are rejected under 35 U.S.C. § 103 for obviousness predicated upon Akira in view of Tao

In the fourth enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the semiconductor device of Akira in view of Tao to arrive at the claimed invention. This rejection is respectfully traversed.

Applicants respectfully submit that one having ordinary skill in the art would not have been motivated to arrive at the claimed invention on the basis of the Examiner's asserted motivation to combine. With regard to the motivation to combine, the Examiner asserted the following:

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the mask of Akira with a hard mask, such as taught by Tao et al. in order to form the wiring layer with enhanced sidewall profile uniformity.

The Examiner's assertion motivation to combine is unpersuasive for several reasons. In contrast to the Examiner's determination, Tao does not advocate replacing a photoresist mask (such as taught by Akira) with a hard mask. In fact, Tao teaches using a photoresist mask 40a, 40b in the formation of the gate electrodes 36a, 36b (Figs. 4 and 5; column 9, lines 6-13) in addition to a hard mask.

Furthermore, the Examiner has ignored the consequences of replacing a "soft" mask (i.e., a photoresist) with a hard mask, such as silicon nitride. The Examiner has not established that these materials/features are universally equivalent. Furthermore, very good reasons exist why one having

ordinary skill in the art would choose a hard mask over a photoresist or vice versa. For example, a photoresist is easily removed by a process (such as oxidation) that does not etch away at the other features in the semiconductor device. In contrast, a hard mask, such as silicon nitride, must be removed by an etching process, which can disadvantageously etch other features in the semiconductor device. Similarly, the hard mask acts as a better mask during etching for the underlying material. As such, one having ordinary skill in the art would not treat these two types of mask fungible for all purposes.

Applicants also question the Examiner's alleged benefit of "enhanced sidewall profile uniformity." Although the Examiner has neglected to point out where this particular motivation can be found in the applied prior art, Applicants note Tao does not teach that the enhanced sidewall profile uniformity is a direct result of using a hard mask. Instead, Tao teaches that the enhanced sidewall profile is a result of the Tao process as a whole. The Examiner, therefore, is taking a single feature (i.e., the hard mask) from Tao and impermissibly attributing to this lone feature the asserted benefit of enhanced sidewall profile uniformity. How does the Examiner know that the asserted benefit does not come from providing a step portion on the semiconductor device (column 3, lines 13-14 of Tao), or from providing a conductive layer over the semiconductor device and step portion (column 3, lines 14-15), or from flattening an upper surface of the conductive layer (column 3, line 16), or from patterning the conductive layer on the semiconductor layer and on the step portion (column 3, lines 17-20) or from a combination of such features? The Examiner has provided no facts or reasoned argument to establish that the hard mask alone of Tao provides the benefits being attributed to it by the Examiner. Thus, one having ordinary skill in the art would not have been motivated to modify Akira in view of Tao in the manner suggested by the Examiner. Applicants,

therefore, respectfully submit that the imposed rejection of claims 1-3, 5 and 17 under 35 U.S.C. § 103 for obviousness predicated upon Akira and Tao is not viable and, hence, Applicants solicit withdrawal thereof.

Claim 4 is rejected under 35 U.S.C. § 103 for obviousness predicated upon Akira in view of Tao and further in view of Williams

In the fourth enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the semiconductor device of Akira in view of Tao and Williams to arrive at the claimed invention. This rejection is respectfully traversed.

Claim 4 depends ultimately from independent claim 1, and Applicants incorporate herein the arguments previously advanced in traversing the imposed rejection of claim 1 under 35 U.S.C. § 103 for obviousness based upon Akira in view of Tao. Specifically, one having ordinary skill in the art would not have been motivated to modify Akira in view of Tao in the manner suggested by the Examiner. The tertiary reference to Williams does not address deficiencies of Akira and Tao. Accordingly, the proposed combination of references would not yield the claimed invention. Applicants, therefore, respectfully submit that the imposed rejection of claim 4 under 35 U.S.C. § 103 for obviousness based upon Akira in view of Tao and Williams is not viable and, hence, solicit withdrawal thereof.

Applicants have made every effort to present claims which distinguish over the prior art, and it is believed that all claims are in condition for allowance. However, Applicants invite the

Examiner to call the undersigned if it is believed that a telephonic interview would expedite the prosecution of the application to an allowance. Accordingly, and in view of the foregoing remarks, Applicants hereby respectfully request reconsideration and prompt allowance of the pending claims.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417, and please credit any excess fees to such deposit account.

Respectfully submitted,

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